

**CLAIMS**

We claim:

1. A radiation detector comprising:
  - a radiation source directing radiation along a propagation axis;
  - 5 a detector positioned to receive the radiation, the detector including a plurality of sheets oriented to extend substantially along the propagation axis and spaced transversely across the axis to define a plurality of axially extending detector volumes, the sheets receive radiation longitudinally and generate high-energetic electrons exiting the material into the detector volumes; and
  - 10 detection means detecting negatively and positively charged high-energetic particles liberated into the detector volumes to provide for substantially independent signals.
2. The radiation detector of claim 1 wherein the detection means is an amorphous selenium detector.
- 15 3. A megavoltage radiation detector comprising:
  - a radiation source directing megavoltage radiation along a propagation axis;
  - a detector positioned to receive the radiation, the detector including a plurality of sheets oriented to extend substantially along the propagation axis and spaced transversely across the axis to define a plurality of axially extending detector volumes, the sheets
  - 20 receive radiation longitudinally and generate high-energetic electrons exiting the material into the detector volumes; and

detection means detecting negatively and positively charged high-energetic particles liberated into the detector volumes to provide for substantially independent signals.

4. A method of fabricating a megavoltage radiation detector, the method comprising the steps of:
  - depositing a plurality of readout electrodes on at least one surface of a substrate;
  - depositing an amorphous selenium layer on at least one surface of the readout electrodes; and
  - depositing a high voltage electrode layer on at least one surface of the amorphous selenium layer.
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